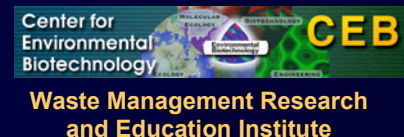


IPTAI

Indiana-Princeton-Tennessee Astrobiology Initiative

Biosustainable Cycles on Earth and Mars



IPTAI Team Members

L.M. Pratt, R. Droppo and M. Jasiak - Indiana University

T.C. Onstott, C. Dismukes and S. Myneni - Princeton University

S.M. Pfiffner, K. Davis and D.C. White - University of Tennessee

D. Pearson and E. Ripley - Indiana University, Bloomington

B. Sherwood Lollar - University of Toronto

S. Clifford - Universities Space Research Association

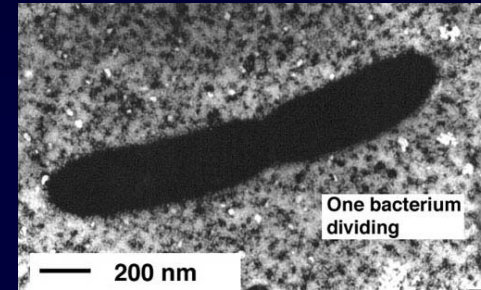
T. Hazen - Lawrence Berkeley National Laboratory

T.J. Phelps and L. Riciputi - Oak Ridge National Laboratory

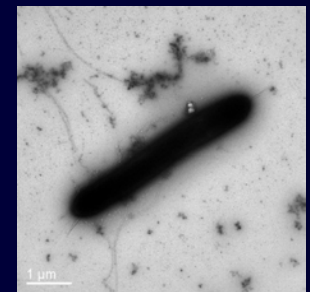
J. Fredrickson, F. Brockman and D. Moser - Pacific Northwest Laboratory

IPTAI Science

- Detecting biosustainable energy and nutrient cycling in the deep subsurface of mines in Canada and South Africa
- Analyze microbial/mineral/ion/gas interactions
- Determine isotopic signatures of organic and inorganic species
- Document genomic diversity and metabolic strategies
- Study gene expression and metabolic changes in response to environmental stress
- <http://geoweb.princeton.edu/research/geomicrobio/index.html>



Thermus multireducens



Alkaliphilus transvaalensis



Geobacillus thermoleovorans

Community Structure

PLFA-cell membrane

16SrDNA

Enrichments
Genes &
Enzymes

Subsurface
Microbial
Biogeochemical
Cycling

Function
Isolates &
Archives

Environment

Aqueous
Geochemistry

Microscopy
& Mineral
Geochemistry

Dissolved Gases,
Cosmogenic
& Stable Isotopes

Pfiffner and Davis IPTAI Dec03

Wits biotill
Northern Arizona Univ. EHT-15.00 kV 300nm
27-Apr-1999 Detector=SE1 Mag=20.00 K X WD= 17 nm



IPTAI Previous EPO

Purpose:

Recruit and engage students

- Undergraduate hands-on experience
- Unique and exciting scientific research
- Interaction with faculty mentors

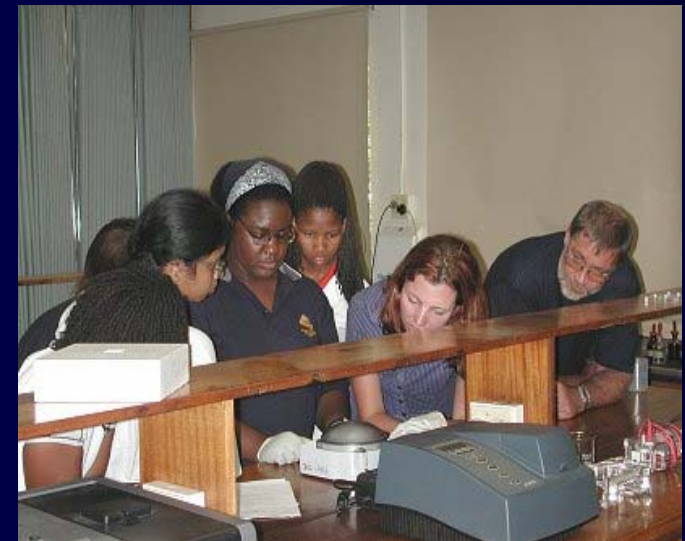
Encourage students towards scientific careers

- Retention of professionals in science and engineering fields

Explore opportunities for expanding the educational, research and biotechnological efforts

Capitalized on interdisciplinary research

Foster a science and technology pipeline





IPTAI Previous EPO

- One week hands-on field and laboratory workshops on Life in Extreme Environments and their Biotechnological Application
- REU Site: Biogeochemical Educational Experiences-South Africa (BEE-SA)
- <http://geomicro.utk.edu>

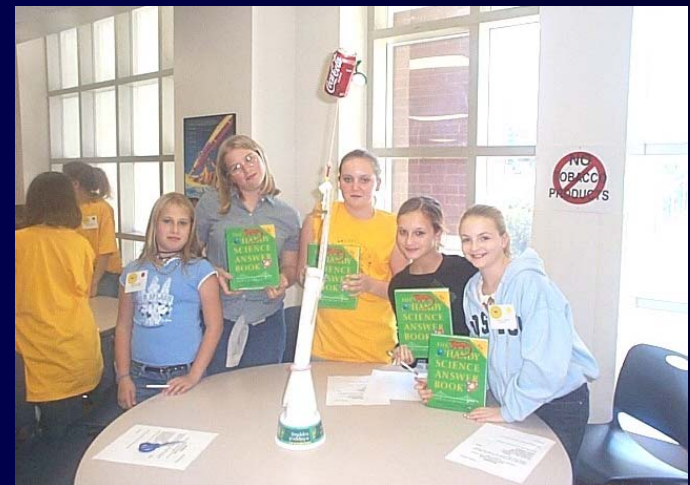


IPTAI Previous EPO

- Training of undergraduates, graduates, and postdocs
- Invited seminars at K-12 schools, universities, churches, and other public forums
- SHADES- SHared ADventures in Engineering and Science – hands-on symposium for 11-12 year old girls



Design Competition
Crash landing on Mars



IPTAI On-going EPO

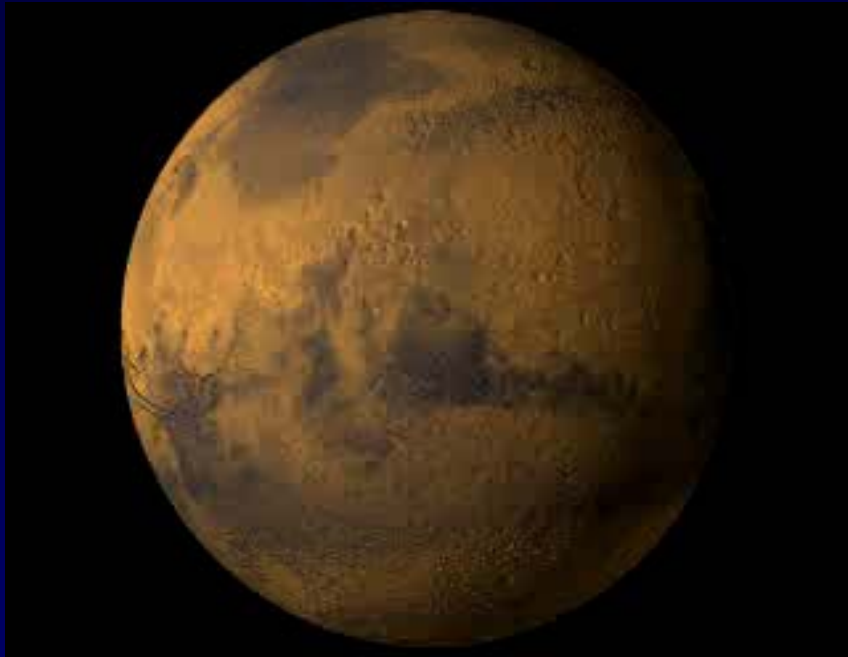
- Brownie Math and Science Event
 - 230 girls (1st to 3rd graders)
30 minutes hands-on activities
 - Thinking about Water and Life on Mars
- Educational workshops for undergraduate and high school teachers
- Web site with animations and video that illustrate how and why scientist conduct research in the deep mines



In Episode Two of The Sacred Balance TV Series, David Suzuki travels to a South African gold mine, goes three miles beneath the surface with Tullis Onstott, and finds life forms that, until very recently, no one knew existed.

www.sacredbalance.com

IPTAI On-going EPO



- Mentoring of undergraduate and graduate research
- Design college-level geomicrobiology and astrobiology courses
 - Astrobiology certificate at Princeton by 2008
- Development of a web-based series for pre-college students
 - Quantitative and investigative activities
 - Highlighting diverse careers of leading women on IPTAI